

Northwest Airways Hanger and Administration Building
(IFT Hanger)
St. Paul Downtown Airport (Holman Field)
590 Bayfield Street
St. Paul
Ramsey County
Minnesota

HAER No. MN-37

HAER
MINN,
62-SAIPA,
23-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Rocky Mountain Regional Office
Department of the Interior
P. O. Box 25287
Denver, Colorado 80225

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HISTORIC AMERICAN ENGINEERING RECORD

NORTHWEST AIRWAYS HANGAR AND ADMINISTRATION BUILDING

Location: 590 Bayfield Street
St. Paul Downtown Airport (Holman Field)
St. Paul
Ramsey County, Minnesota
UTM: 15:496660:4976300
Quad: St. Paul East, Minnesota (7.5 minute series, 1980)

Date of Construction: 1930

Present Owner: City of St. Paul

Present Use: Building was demolished in December 1988

Significance: Northwest Airways Hangar and Administration Building was the airline's first corporate headquarters expressly built for that purpose. Constructed shortly after the company's takeover by St. Paul and Minneapolis interests, the building helped establish the Twin Cities as Northwest's center of operations for more than the next half century. In its materials, structural engineering, and layout, the building was highly representative of American hangar design during the early years of commercial aviation. As one of the few remaining examples of its type, Northwest Airways Hangar and Administration Building was declared eligible for the National Register of Historic Places in the spring of 1988.

Historian: Jeffrey A. Hess, March 1989

Northwest Airways Hangar and Administration Building at St. Paul Municipal Airport¹ was the airline's first corporate headquarters expressly built for that purpose. Constructed shortly after the company's takeover by St. Paul and Minneapolis interests, the building was as much an assertion of local pride as an expression of faith in the airline's future. Over the next half century, Northwest Airways -- now known as Northwest Airlines -- would become a major transcontinental and intercontinental carrier. Its corporate headquarters, however, was to remain in the Twin Cities.

When Northwest Airways was incorporated in August 1926, its initial goal was to secure the Post Office contract for airmail service between the Twin Cities and Chicago. The route had been attempted twice before -- once by the Post office itself in 1920-1921, and again in the summer of 1926 by a Minneapolis-based enterprise that lasted only a few months before succumbing, as had the earlier government operation, to bad weather, mechanical problems, and an appalling loss of pilots and planes.² The driving force behind the new venture was real-estate developer Lewis H. Brittin who, as vice president of the civic-minded St. Paul Association, had been instrumental in persuading the City of St. Paul in the spring of 1926 to acquire an airport site just south of the downtown area. He was less successful, however, in attracting private Twin Cities capital to commercial aviation. His principal backers were from Detroit. Indeed, when Brittin sallied forth as vice president and general manager of the new airlines, he was the sole representative from the Twin Cities on an otherwise solid Detroit slate of corporate officers. The company itself held Michigan incorporation papers.³

On September 4, 1926, Northwest Airways was awarded, as sole bidder, the Post Office contract for the Twin Cities-Chicago airmail route. Scheduled flights began on October 1. Originally, the company's fleet consisted of two planes, which operated out of a leased hangar at Wolde-Chamberlain Field near Minneapolis. Since St. Paul Municipal Airport had no storage or maintenance facilities, it served only as a touch-down point for picking up and delivering mail. In 1927, however, the City of St. Paul equipped the field with a new brick-clad, steel-framed hangar, measuring

100 feet square. The building included a "waiting room, a tool and spares room, a small machine shop, and a boiler room." Northwest attempted to lease the hangar for its exclusive use, but the city chose to maintain it as a public facility, open to all craft that paid a storage fee. Nevertheless, the building encouraged Northwest to include St. Paul as a regular stop when it inaugurated passenger service between the Twin Cities and Chicago in July 1927.⁴

By the spring of 1929, Northwest Airways had logged nearly one million miles of scheduled flights. The company had been particularly resourceful in expanding its passenger business, becoming the first airline to institute "complete coordinated air-rail service by which passengers could be transferred from planes to trains and vice versa."⁵ As the company increased its public stature and revenues, a group of Twin Cities businessmen decided that "civic responsibility," as well as financial prudence, dictated that the operation should be controlled by local interests. Accordingly, in May 1927, Twin Cities investors bought out the Detroit owners, naming Richard Lilly, a St. Paul banker, as president and A. R. Rogers, a Minneapolis lumberman, as chairman of the board. Brittin remained vice president and general manager.⁶

Under the new Twin Cities ownership, Northwest embarked on a period of rapid expansion across the northern tier states, pushing westward to Fargo and Billings, finally reaching Seattle in 1934. Although expansion eastward was delayed by World War II, service between the Twin Cities and New York was finally inaugurated in June 1945, making Northwest the country's fourth transcontinental airline, and the only one to reach that goal by internal growth rather than merger.⁷ As counterpoise to geographic expansion, the company during the 1930s firmly anchored its administrative operations in the Twin Cities. Immediately after buying out the Detroit shareholders, the new board set up temporary offices in the Merchants Bank Building in St. Paul and made plans to build a corporate headquarters at St. Paul Municipal Airport. The building site was leased from the city under a 30-year agreement that guaranteed rent-free possession for the first 10 years. For their

architect, the board selected Clarence H. Johnston, Sr., who was approaching the end of a distinguished 50-year career that had made him the acknowledged "dean of his profession" in the Twin Cities.⁸

Born in rural Waseca County, Minnesota in 1859, Johnston grew up in St. Paul, leaving in 1877 to study architecture at the Massachusetts Institute of Technology. After apprenticing with architectural offices in New York and St. Paul, Johnston traveled widely in Europe, returning to St. Paul in 1886 to set up his own office, which he maintained until his death in 1936. Johnston's success owed as much to his administrative ability as to his conservative, historic revival designs, which garnered the admiration of wealthy patrons and public officials alike. In addition to a prolific private practice in residential, commercial and ecclesiastical commissions, Johnston also served for 30 years as the official "state architect," designing "literally hundreds" of state-owned buildings throughout Minnesota. The Northwest Airways commission was apparently his only airport project.⁹

Although there are no surviving plans or specifications for Johnston's work on the Northwest Airways building, his professional papers at the University of Minnesota do contain a photograph of an architectural rendering entitled "Hangar and Administration Building -- Northwest Airways Inc." (see HAER Photo No. MN-37-30). This is the same image that appeared in the St. Paul Pioneer Press of September 23, 1929, accompanying an announcement that construction would "begin next month." According to Northwest accounting records compiled at the time, work did indeed begin in the fall of 1929, with Steenberg Construction Company of St. Paul serving as general contractor. By February 1, 1930, construction was far enough advanced to allow the company to move into the office section of the building; the hangar section was occupied "the latter part of March." Total cost, including Johnston's fee of \$3,769, amounted to \$112,977.¹⁰ As documented by photographs taken in May 1930, the completed building conformed to Johnston's original conception (see HAER Photo Nos. MN-37-25, MN-37-26).

Functionally speaking, Northwest Airways Administration and Hangar Building belonged to that category of airport structures known as "depot hangars." Unlike the more specialized "service hangar" and "sales hangar," the depot hangar was a multi-purpose structure modeled after the urban railroad depot. According to one author on the subject, the depot hangar might reasonably include, in addition to the actual storage space for planes, "the waiting room, lounge, observation deck, public toilets and rest rooms, general offices and shop, sleeping accommodations for pilots and mechanics, a large machine shop with a stock room, and a classroom."¹¹ The Northwest building contained most of these facilities, organized into three well-defined spaces according to general function (see Supplementary Data section). The largest space was the hangar proper: a two-story-tall, shallow-pitched, gable-roofed structure measuring approximately 200 feet (east-west) by 85 feet (north-south). Adjoining the hangar on the north was a one-story maintenance and repair shop, while on the west stood an administration wing partitioned into corporate offices, a ticket office, and a passenger waiting room.¹² Visually, the three parts of the building were unified into a single composition by their common brown brick cladding and by the repetition of an arch motif over the side windows of the hangar and over the entrance door of the administration wing. In the same way that Northwest Airways Hangar and Administration Building fulfilled the conventional functions of its genre, so too did its steel-framed, masonry-wall construction embody the most popular materials for American hangars. The professed advantages of these materials were "the comparatively low cost of construction compatible with permanency of structure, ease of expansion and alterations, low maintenance, [and] adaptability to architectural treatment."¹³

According to airport design guidelines of the period, commercial hangars required clear spans of at least 100 feet and vertical clearance of about 20 feet.¹⁴ To provide the necessary floor space for the Northwest Airways hangar, Johnston resorted to a cantilevered roof-truss system, which, by eliminating almost all columns, permitted large clear spans and wide door openings. The only

obstruction in the floor area was a steel column located midway between the side (east and west) walls and about 28 feet from the hangar opening. This column supported a massive, riveted Pratt truss, the ends of which were carried on steel columns imbedded in the side walls. Fabricated of heavy, rolled, I-beams and displaying a flat upper chord, the Pratt served as a "carrying truss" for seven, evenly spaced, roof trusses fashioned of angles and channels. Supported at the rear (north) end by a steel column imbedded in the wall masonry, each roof truss intersected the Pratt at right angles, so that approximately the forward 28 feet of the roof truss formed a cantilevered section at the front of the hangar. Johnston may have derived his cantilevered design from a similar carrying truss system employed in the recently completed National Air Transport Hangar at Cleveland Airport.¹⁵ Johnston's building itself apparently served as the model for a new city-owned hangar (see HAER Photo No. MN-37-25) completed at the field in the summer of 1930 for use by the 109th Air Squadron of the National Guard.¹⁶ Displaying virtually the same dimensions and the identical Pratt carrying truss, the municipal hangar substituted bowstring roof trusses and an arched roof for the trapezoidal roof trusses and pitched roof of Johnston's Northwest Airways building (see HAER Photo No. MN-37-31).

The cantilevered roof trusses of the Northwest Airways hangar furnished sound structural support for an unobstructed door opening 200 feet in width. From the outside of the building, however, the true nature of the support was concealed from the viewer. To the adherents of the form-follows-function school of modern architecture, this state of affairs may have been of little concern, but it was troubling to many architects and their clients who were immersed in an historic revival tradition. In addressing this perceptual problem, Johnston employed a device that was already something of a convention in hangar design: he framed the hangar opening with false (i.e., non load-bearing) piers or buttresses, which conveyed a sense of structural support and overall solidity.¹⁷

The hangar opening itself presented a challenge of another kind. In the early years of hangar construction during World War I, designers found that "the main door was the most vexing problem" because "there just wasn't any such thing as a large door." The initial solution was to use "a number of small doors . . . hung from the top on barn door rollers made to run on tracks across the top of the door opening."¹⁸ In the 1920s, the suspended wood door gave way to a sturdier steel door, supported on the bottom by cast-steel rollers running on floor tracks. This improved type of manually operated, sliding, multi-leaf, steel door was incorporated into the Northwest Airways hangar under the "Tenestra" brand name, as marketed by the Detroit Steel Products Company. Readily maneuvered by a single person, the door panels ran on three parallel tracks in the concrete floor, affording "a round-the-corner" storage in a stacked position (see HAER Photo Nos. MN-37-14, MN-37-15).

In 1934, the same year that Northwest Airways reincorporated under Delaware statutes as Northwest Airlines, the company announced that "a shop extension [was] soon to be erected" at its headquarters in St. Paul. Completed in 1936, the building's enlargement consisted of second-story additions on both the administrative wing and the shop facility (see HAER Photo Nos. MN-37-27, MN--37-28). The remodeling program apparently permitted Northwest to double the building's staff to about 160 personnel. On December 31, 1937, St. Paul airport authorities suspended all passenger service at the field in preparation for an ambitious, three-year, improvement program that included the upgrading of runways and the construction of a municipally owned administration building. During this period, Northwest operated its Twin Cities passenger flights out of Wolde-Chamberlain Field near Minneapolis, retaining the St. Paul Administration and Hangar Building as its office and overhaul center. The building's ticket office and waiting room were not reopened when Northwest resumed passenger service at St. Paul in the spring of 1940. Instead, the company relied on the customer-service facilities provided by the city's new Airport Administration Building.¹⁹

When the United States entered World War II, the Army took over St. Paul Municipal Airport for use as a "Bomber Modification Center." Equipped with two, new, large, service hangars, the base adapted thousands of aircraft for the special demands of the various theaters. Although Northwest Airlines moved its civilian operations off the field, the company remained at the site as the contract-operator of the new military program. Its former headquarters continued in use as an office-and-overhaul facility. The building also took on a new role as a training center for pilots and mechanics, receiving, in 1942, a one-story, wood-framed classroom addition on the southeast corner of the Administration Wing.²⁰

In the summer of 1946, the Army shut down its operations at St. Paul Municipal Airport and turned all facilities over to the Metropolitan Airports Commission (MAC), a public agency that had been created in 1943 by the Minnesota Legislature to supervise post-war airport development in the Twin Cities. Designating Wolde-Chamberlain Field as the region's main commercial airport, MAC decreed that the St. Paul field should be developed as a "secondary" airport "to serve the present and anticipated 'executive' aviation transportation demands of the Twin Cities area." Under this general plan, Northwest Airways Hangar and Administration Building was improved with a one-story, brick, garage addition on the west side of the hangar, and leased out to a succession of private firms catering to the executive market. Technically known as "fixed base operators," these leaseholders used the building for airplane storage, maintenance, sales, and flight instruction.²¹

During the 1970s, MAC reevaluated, and ultimately reaffirmed, its original goals for St. Paul Municipal Airport. At the same time, MAC endorsed the upgrading of the field's flight control and runway facilities, which called for the eventual demolition of Northwest Airways Hangar and Administration Building. As part of the environmental review process, the demolition was approved in 1982 by the Minnesota State Historic Preservation Office (SHPO), which, at that time, did not consider the building to be of architectural, historical, or technological significance. In the fall of

1987, MAC demolished the building's administration wing, intending to clear the rest of the site the following spring. During the interim, the building's significance was reevaluated by the Smithsonian Institution and SHPO, resulting in a "determination of eligibility" in April 1988.²² Aviation historians at the Smithsonian were particularly impressed by the fact that the building was "one of the few remaining . . . example[s] of aviation-related industrial buildings erected during the infancy period of development of the nation's airlines."²³ After reviewing various alternatives to demolition, the agencies involved eventually acknowledged that it was not feasible to save the building. As a means of mitigating the "adverse effect" to the building, the parties entered into a Memorandum of Agreement stipulating that, prior to further demolition, the building would be recorded according to "Level II Standards" of the Historic American Buildings Survey/Historic American Engineering Record. This study is intended to fulfill that obligation.²⁴ Following the completion of the requisite field survey and photography, the building was demolished in December 1988.

NOTES

1. As is documented in the text, Northwest Airways Hangar and Administration Building is the structure's original name. During the last 20 years, however, the building has also been known as "Hangar No. 2" (thereby distinguishing it from an earlier hangar at the airport) and as the "IFT Hangar," (after the building's most recent tenant, Instrument Flight Training, Inc.); Jeffrey A. Hess, Interview with R. Robert Juare, Senior Maintenance, St. Paul Municipal Airport. The St. Paul airport has also gone by several names. Originally established as St. Paul Municipal Airport in 1926, it was officially redesignated in 1931 as Holman Municipal Airport, in memory of Charles W. "Speed" Holman, a Northwest Airways employee and well-known stunt flyer who died in a crash earlier that year. Popular usage shortened the name to "Holman Field." In 1961, city authorities decided that the title lacked geographic clarity, which they remedied by renaming the facility "St. Paul Downtown Airport." A year later, however, the defenders of Speed Holman's memory won a parenthetic victory so that the airport's official designation now reads: "St. Paul Downtown Airport (Holman Field)." In this study, we will refer to the field by its historic name: St. Paul Municipal Airport. See "Origin and Development of the St. Paul Municipal Airport," unpublished, c. 1961, in Metropolitan Airports Commission Administrative Office, St. Paul Municipal Airport; U. S. Department of Commerce, Bureau of Air Commerce, Descriptions of Airports and Landing Fields in the United States (Washington, D.C.: United States Government Printing Office, Airway Bulletin No. 2, 1938), p. 103; "Airport's New Name: 'St. Paul Downtown,'" Minneapolis Tribune August 8, 1961; "St. Paul Plans Rededication of Holman Field," Minneapolis Tribune, April 2, 1962.

"Airport's New Name: 'St. Paul Downtown,'" Minneapolis Tribune August 8, 1961; "St. Paul Plans Rededication of Holman Field," Minneapolis Tribune, April 2, 1962.

2. Before abandoning the Minneapolis-Chicago route in June 1921, the Post Office lost 4 pilots and 8 planes. The route was revived in June 1926 by Minneapolis aviator Charles "Pop" Dickinson, under the provisions of the 1925 Air Mail Act ("Kelly Act"), which required the Post Office to contract out airmail delivery. After two disastrous months of missed schedules and downed planes, Dickinson petitioned to suspend operations and relinquished the contract on October 1, 1926; see Henry Ladd Smith, Airways: The History of Commercial Aviation in the United States (New York: Alfred A. Knopf, 1942), 13; pp. 94-103-110

3. Stephen E. Mills, More Than Meets the Sky: Pictorial History of the Founding and Growth of Northwest Airlines (Seattle: Superior Publishing Company, 1972), pp. 13-14; Rosie Stein, "History [of] Northwest Airways, Inc.," unpublished, c. 1944, pp. 4-5, in Northwest Airlines Papers, Records of the Public Relations Department, Box 2, Minnesota Historical Society. Brittin had forged an alliance with Detroit business interests in the early 1920s, when he successfully negotiated with Ford Motor Company to establish a branch automobile assembly plant in St. Paul. At that time, Henry Ford was just entering the aviation field, with an investment in the aircraft factory of the noted aeronautical designer William B. Stout. Stout was one of the original investors in Northwest Airways, serving as corporate secretary; see Stein, p. 5; Smith, pp. 105-106; Timothy C. Glines, "The Twin Cities Ford Assembly Plant," Guide to the Industrial Archeology of the Twin Cities, ed., Nicholas Westhrook (Twelfth Annual Conference of the Society for Industrial Archeology, St. Paul and Minneapolis, 1983), pp. 104-107.

4. Northwest's early years are discussed in Mills, p. 14. The primitive conditions at St. Paul Municipal Airport and Northwest's interest in the first hangar are noted in the reminiscences of the airport's first director in Anne M. Holey, Interview with Francis J. Geng, June 12, 1965, unpublished, pp. 2-3, in Air Museum of Minnesota Papers, Box 1, Minnesota Historical Society. The description of the hangar itself is from William N. Carey, "St. Paul Builds an Airport One Mile from Post Office," Engineering News-Record, 105 (August 21, 1930), 295. Although in deteriorating condition, the airport's original hangar still exists.

5. Stein, p. 8.

6. On the company's takeover by Twin Cities interests, see Harold R. Harris, "Commercial Aviation," Minnesota History, 33, (Summer 1953), 239. Harris was company president at the time of his comments; he stresses that "at the beginning" the local investors "were prompted more by a sense of civic responsibility than by a thought of profit."

7. Mills, pp. 29-40; R. E. G. Davies, A History of the World's Airlines (London: Oxford University Press, 1964), pp. 49-51, 247; Charles J. Kelly, Jr., The Sky's the Limit (New York: Coward-McCann, Inc., 1963), p. 274.

8. Mills, p. 14; Holey, Interview with Geng, p. 4; "In Tribute to Clarence H. Johnston, Sr., A Great Architect," Northwest Architect (January 1937), 9. It was common for municipal airports "to lease land to tenants, who have constructed their own hangars"; Henry V. Huhhard and others, Airports, Their Location, Administration and Legal Basis (Cambridge, Mass.: Harvard University Press, 1930), p. 83.

9. For a concise summary of Johnston's career, see Patricia Murphy, The Public Buildings of the State of Minnesota: An Architectural Heritage (St. Paul: Minnesota Historical Society, 1986), pp. 6-7.

10. For information on construction schedule and costs, see Account 603, "Buildings and Improvements on Land Not Owned," in the Capital Record Ledger for 1929-1930, unpublished, Northwest Airlines Papers, Box 7, Minnesota Historical Society.

11. Louis M. Steuber, "Commercial Hangars," American Architect, 136 (July 20, 1929), 81.

12. This discussion of the building's original layout and function is based on S. Paul Johnston, "In the Northwest," Aviation, 33 (February 1933), 46-48; a photocopy of the article is included in the "Supplementary Data Pages" of this study. The placement of the shop facilities along an exterior wall conformed to standard design guidelines of the time: "Hangar shops are usually located near exterior walls where the light intensity is highest, and most of the detailed repairs are done there"; Roger W. Sherman, "Airplane Hangars," Architectural Forum, 53 (December 1930), 773.

13. W. A. Hemphill, "General Requirements for Permanent Types of Airport Structures," Airports, 7 (July 1931), 15.

14. Tyler Stewart Rogers, "Airports, -- The New Architectural Opportunity," Architectural Forum, 50 (April 1929), 600; R. W. Sexton, "Airplane Hangar Design," Architectural Forum, 52 (January 1930), 123; W. D. Archer, "Practical Airports," American Architect, 136 (July 20, 1929), 84. For an airport to receive an "A" rating from the U. S. Department of Commerce, it was required to have "at least one hangar measuring not less than 80 feet by 100 feet in the clear inside with doors open, with 18 foot overhead clearance"; as quoted from federal guidelines in Robert L. Davison, "Airport Design and Construction," Architectural Record, 65 (January 1929), 512.

15. "Airport Passenger Depots Planned," Iron Age, 124 (October 17, 1929), 1023-1026. The same type of cantilevered system was used for new hangar construction as late as 1947; see Fred N. Severud, "Hangars Analyzed," Architectural Record, 101 (April 1947), 119.

16. William N. Carey, "St. Paul builds an Airport One Mile From Post Office," Engineering News-Record, 105 (August 21, 1930), 294-295. Plans and specifications for the municipal hangar are on file at the St. Paul City Engineer's Office. These documents show that the design was completed in November 1929, after construction had already commenced on the Northwest Airways building. In his article on the municipal hangar, Carey credits himself "in his former capacity as superintendent of the bureau of construction in the department of public works" as being "in immediate charge of design and construction." He does not allude to Johnston or the Northwest Airways building. Although the building's exterior has been remodeled beyond recognition, the original bowstring roof trusses can still be seen from a crawl space in the attic.

17. A similar combination of cantilevered roof trusses and false piers appeared in the 1927 Ford hangar at Lansing, Illinois and the 1929 National Air Transport Hangar at Cleveland; see "Ford Airport Hangar on National Register," Society for Industrial Archeology Newsletter, 14 (No. 4, 1985), 8; William E. Arthur, "How Shall We Design Our Airports?" Scientific American, 141 (October 1929), 299.

18. J. I. Byrne, "Hangar Door Design," Aero Digest, 35 (October 1939), 49.

19. The proposed expansion is noted in Johnston, 48. There are no existing plans or specifications for the additions, but the 1936 construction date is recorded in "Report on Hangar No. 2, St. Paul Downtown Airport," unpublished, 1973, n.p., in Hangar No. 2 File, Metropolitan Airports Administration Building, Minneapolis; see also the reference to "construction work on St. Paul and Spokane hangars" in the company's "Report for Month of April 1936," unpublished, May 1936, n.p., in Northwest Airlines Papers, Box 2, Minnesota Historical Society. On the building's increased staff, see "St. Paul Airlines Achieve New Peak in Passenger Service," St. Paul Daily News, First Section, April 14, 1935; untitled history of St. Paul Municipal Airport, dated January 7, 1937, in Metropolitan Airports Administrative Office, St. Paul Municipal Airport. The suspension and resumption of passenger service at the field are discussed in Paul D. Hagstrum, "City Boasts 'New' Airport," ACE (July 1940), 5, 15; "NWA Moves Into New Building," St. Paul Pioneer Press, March 30, 1941; "St. Paul's Airplane Service Restored After 3 Years," St. Paul Dispatch, May 9, 1941.

20. The construction date is noted in "Report on Hangar No. 2."

21. Donald V. Harper, "The Minneapolis-St. Paul Airports Commission," Minnesota Law Review, 55 (January 1971), 422; see also "Army Releases Exclusive Hold on Holman," Minneapolis Times, April 8, 1946; "Minneapolis Airports Financial and Statistical History Exhibit," unpublished, 1946, p.101, in Minneapolis Public Library. Principal leaseholders were Northwest Aeronautical Company (1947-1961), Airline Equipment Corporation (1962-1963), LaMotte Aviation (1963-1969), Holman Aviation, Inc. (1969-1973), and Instrument Flight Training, Inc. (1973-1987). This list was compiled from "Report on Hangar No. 2"; C. Warren Peterson, MAC Director of Properties, Memorandum to H. G. Kuitu, MAC Executive Director, MAC, October 11, 1973, unpublished, in Hangar No. 2 Files, Metropolitan Airport Commission Administration Building, Minneapolis; Hess, Interview with Juaire. According to Juaire, who began working at the St. Paul airport in 1947, the garage addition was built in the early 1950s, but the MAC's "Report on Hangar No. 2" gives the construction date as 1956. Lacking plans, specifications, or photographs that corroborate either date, we have followed the MAC record.

22. For the general planning issues necessitating the hangar's removal, see "Documentation For IFT Hangar Removal," attached to Franklin D. Benson, Manager, Federal Aviation Administration, to Charleen Dwin, Historic Preservation Specialist, Advisory Council on Historic Preservation, August 2, 1988, in Northwest Airways Hangar and Administration Building File, SHPO, Minnesota Historical Society. The same file also contains SHPO's original evaluation of the building and its reassessment: Dennis A. Gimmetstad, SHPO staff member, to Theodore A. Wendland, Jr., Chief, Department of Transportation, Federal Aviation Administration, July 19, 1982; Gimmetstad, Deputy State Historic Preservation Officer, to Walter Hellman, Director of Operations and Noise Abatement, MAC, April 8, 1988. The ensuing controversy over the hangar's demolition is described in "Last-Ditch Effort Launched to Save Hangar," St. Paul Dispatch, April 19, 1988; "Historians Go to Bat for Old Hangar at Holman Field," Twin Cities Star-Tribune, May 14, 1988.

23. R. E. G. Davies, Curator of Air Transport, National Air and Space Museum, Smithsonian Institution, to Walter Hellman, Director of Operations and Noise Abatement, MAC, April 19, 1988, in Northwest Airways Hangar and Administration Building File, SHPO, Minnesota Historical Society.

24. The Northwest Airways Hangar and Administration Building File at SHPO, Minnesota Historical Society, contains a copy of the Memorandum of Agreement, which was signed by Nina M. Archabal, Minnesota State Historic Preservation Officer on November 23, 1988; Robert D. Bush, Executive Director, Advisory Council on Historic Preservation, on October 17, 1988; and a

representative of the Federal Aviation Administration, on October 18, 1988. The present "Level II" recordation study was conducted by historian Jeffrey A. Hess under a contract between the Metropolitan Airports Commission and the firm of Jeffrey A. Hess, Historical Consultant of Minneapolis. Thomas B. Major served as research assistant; Burt Levy as photographer. Robert Vorpal of MAC was overall project supervisor, while Ted Lofstrom of SHPO provided technical assistance.

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Efficient Maintenance Base at the Twin Cities Is an Important Factor in Northwest Airways' Outstanding Operations Record

"In the Northwest..."

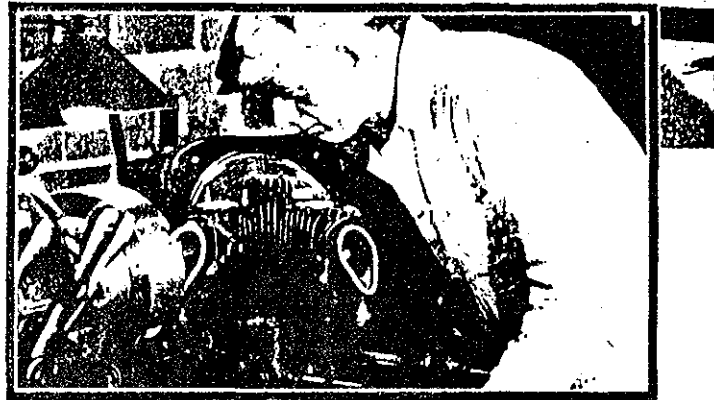
By S. Paul Johnston
Associate Editor, AVIATION

IN the Northwest it's the Northwest Airways." So reads the slogan of the airline which for over seven years has linked together the cities in the Northwest territory with passenger and mail services. Originally organized by Col. L. H. Brittin—now executive vice-president—to operate between the Twin Cities and Chicago, its operations have been pushed westward with the succeeding years through the North Central States and to Winnipeg in Canada. Within the past year its planes have been flying regularly westward from Fargo to Billings, Mont., and announcement has lately been made that in the very near future passenger services will reach the West Coast to Seattle by way of Spokane. Step by step, like the pioneers who fought their way a century ago across the Dakotas and through the passes of the Rockies, its progress has been steady

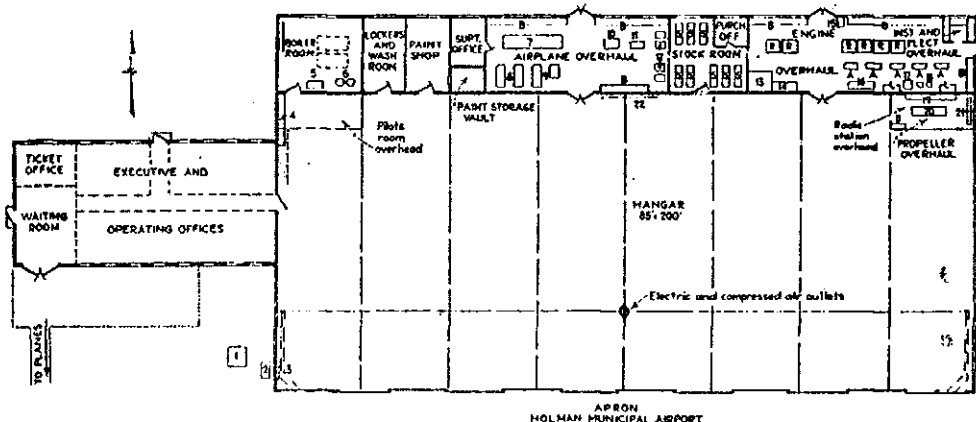
ly westward. Seven years of operation through conditions ranging from summer dust storms of the plains through the ice and snow of the Northwest winters with an enviable record for regularity and without the loss of a single

passenger speaks well for the operation in general and indicates a high degree of efficiency and care in the maintenance of equipment in particular.

Continuing our studies in the field of airline maintenance which has been re-



Refilling valve guide bushings in a special lathe jig in the engine shops at Northwest Airways.



Layout of the St. Paul base of Northwest Airways, Inc. In this compact unit are housed all the necessary facilities for handling passengers, operations, radio, overhaul and maintenance. The principal equipment shown in the hangar is as follows: 1. Fuel pit; 2. Fuel pump; 3. Fuel pump control; 4. Storage battery charging unit; 5. Air compressor; 6. Hot water tanks; 7. Welding bench; 8. Sheet metal brakes; 9. Sheet metal forming rolls; 10. Band saw; 11. Sewing machine; 12. Grinders and drills; 13. Spray cleaning hood; 14. Cleaning tanks; 15. Valve grinder; 16. Lathe; 17. Drill; 18. Grinders; 19. Propeller rack; 20. Extractor table; 21. Balancing stand; 22. Engine and airplane time record board; 23. Benches; 24. Lockers; 25. Stock racks; 26. Engine parts racks; 27. Engine assembly stands.

A black and white photograph showing a large crowd of people gathered in front of a large, dark structure that resembles a train car or a stage set. On the right side of the structure, there is a large rectangular screen displaying a portrait of a man. The scene is outdoors, and the crowd is dense, filling the foreground and middle ground. The image has a grainy, high-contrast quality.

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At the present time consists of with the new three Wasp-powered Trave one Wasp-powered taper (for official use which has been speeded up for J-5 Whirlwind instruction Sikorsky active service) of Lockheed El ordered by Nor at the Burbank future. The total includes 28 W-1-6's and one some 46 Hamilton metal propeller.

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six flying hours), a 35-40 engine check (conducted at St. Paul) and a thorough airframe and engine check at 100-hour intervals. The so-called "light" checks (usually of the daily or trip nature) are conducted at all stations, but the thorough 100-hour checks are carried out at the St. Paul base. Engines are pulled for complete overhaul at 350-hour intervals and propellers come off every 100 hours. They are tracked, re-set and balanced at 100-hour intervals, etched every 50 hours.

The keeping of records of the servicing and overhaul of planes, engines, propellers and other accessories has been the subject of careful study and continual improvement. Log books and card records show the complete operating history of every piece of equipment. The information forms incorporating a listing of every item of plane and engines for checking and initialling by the examining mechanic are printed on heavy cardboard whose color indicates

the equipment covered (pink—metal airplanes; salmon—fabric airplanes; blue—radio and instruments, etc.). A novel feature of these forms is the incorporation of clearance tickets as perforated attachments to the bottom of each card. These tickets (or tags) properly filled in and signed by the chief mechanic responsible for the work must be filed with the dispatcher before any ship is given clearance from the station. The four tags, one for ship, engines, radio and instruments, must be hanging on the proper hook on the main dispatch board before the pilot can sign the final clearance before departure.

The responsibility for the condition of all equipment falls on J. B. LaMont who functions as superintendent of maintenance under Mr. Whittemore. Mr. LaMont supervises not only the work of the St. Paul base but also the servicing procedure at outlying stations. "Jim" LaMont is an old hand at the maintenance business, a real old-timer.

He worked with Glenn Curtiss back in the "June Bug" days; flew a ship of his own in 1911 and was chief mechanic for Lincoln Beachy before his untimely death. LaMont was associated with the Curtiss Company at Hammondport during the War and pre-War days, and he accompanied Ruth Law on her famous aerial expedition into the Orient in 1919. Since that time he has been continuously connected with the business of keeping planes and engines in the air.

Organization

All maintenance and servicing work at St. Paul is allocated under two main divisions, the ship department, supervised by L. Koerner, and the engine department, under the direction of H. Aune. These departments handle everything connected with the flying equipment except the radio installations. The responsibility for the operation and the upkeep of the latter equipment rests with H. M. Bennette, who supervises not only the airplane installations but all ground equipment in the company's communication system as well.

In many airline maintenance bases the day-to-day servicing function and the strictly overhaul functions both for airplanes and engines are kept separated and separate crews assigned permanently to the several operations. At St. Paul, however, under present operating conditions the number of ships entering and leaving the station per day is such that it is readily possible to schedule the work so that separate overhaul and servicing crews need not be maintained, the ship department looking after the daily servicing on airplanes as well as overhaul—the same system being followed in the engine department.

The plant

All the St. Paul operations are housed in a modern brick and steel unit on the Holman municipal airport. An accompanying diagram indicates the dimensions and general arrangement of the building. The wing on the west end houses the passenger handling facilities as well as the operations offices. Its close proximity to the hangar and general maintenance functions makes for an efficient and compact operating unit.

It has previously been pointed out in these pages that the quality of the housekeeping in an airline maintenance shop (or in any industrial layout, for that matter) is a good indication of the quality of the work turned out. On the basis of plant housekeeping the Northwest Airways shops rank high. Everything in the hangar proper and in the adjacent airplane and engine shops is arranged in an orderly fashion and apparently great effort is made to keep everything in its proper place and to keep the floors, walls and windows clean. Liberal use of white paint on the walls and roof structure, as well as plenty of

glassed area makes for very excellent daylighting of all parts of the building. Lockers are provided for all tool and loose equipment. An outstanding example of the way things are done is the boiler room—frequently a neglected spot—but in the Northwest hangar a model of neatness and obvious efficiency. The same could be said of every shop and enclosure in the building from the mechanics' locker rooms through the airplane overhaul, the stockroom and the engine overhaul.

Since most of the equipment in use on the line is of all-metal construction, the airplane overhaul shop is well equipped with tools for handling steel and duralumin sheet parts. The shop is capable of making any sort of repair on metal airplanes and also manufactures ring cowlings, exhaust manifolds, etc. Complete welding equipment is also on hand for the repair of manifolds, engine mounts, and landing gears. The shop can also handle any required work on the few steel tube fuselage machines still in service. For the same purpose it is necessary to maintain a certain amount of woodworking equipment and also to provide sewing machines and cutting tables for making fabric coverings for wings and fuselage. It will be noted that the airplane overhaul shop is adjacent to the stockroom with direct communication through a suitable door. All materials for airplane structures is kept in stock bins immediately adjacent.

The paint shop adjacent to the airplane overhaul is fitted up to handle all sorts of finishing jobs, internal or external, including the doping of fabric surfaces. DeVilbiss spray equipment is installed drawing air from the central tanks and compressor in the boiler room. Painting supplies are stored in a fire-proof vault which opens directly into the shop. A large ventilating fan sucks air from the room and discharges it through a stack. Fresh air is admitted through ducts from out of doors.

Engine overhaul

Under present conditions the engine shop handles twelve to fifteen engines per month. With production on this scale it has been found more economical to operate on an overhaul crew basis rather than on the production line method commonly used in shops handling 40 to 60 engines per month. Incoming engines pass first through a tear-down, cleaning and inspection department and are then turned over to an engine mechanic and a helper who, as a crew, do the entire job of putting the engine back into shape, with the exception of certain highly specialized jobs mentioned below. Complete inspection records and assembly records are carried on suitable forms. Carburetors, electrical equipment, instruments and ignition equipment are taken care of by

mechanics who are specialists in those particular fields. A machine shop in charge of an expert machinist is an integral part of the engine shop and takes care of all machining requirements including all connecting rod and crankshaft work. A number of clever and interesting tool set-ups have been developed for connecting rod boring, valve guide bushing, and other operations. One such is shown in an accompanying illustration. Detailed descriptions of certain outstanding jigs, fixtures and gadgets from the engine and other departments will be treated in the "Servicing Short Cuts" pages of AVIATION.

At present there is no fixed engine run-in equipment at St. Paul. After overhaul, however, all engines are run in on a heavy dummy fuselage (built of sheet iron and steel tubing) which is pushed out on to the apron in front of the hangar and anchored in place. The cockpit is fitted up with a complete set of engine indicating instruments and controls. It is difficult to run gasoline and oil consumption tests with this equipment, but complete measuring apparatus for this purpose will be installed in the new test stands which will be included as a part of a shop extension soon to be erected.

Propellers

Propeller work is handled in a small enclosure in the northeast corner of the hangar proper. This shop is equipped to take care of polishing, balancing, tracking and setting, but at the present time no etching equipment is available at St. Paul. This work is now being done in an auxiliary propeller shop in the Northwest Airways hangar at Milwaukee, but with the completion of the contemplated extension of the St. Paul shops it is planned to move all etching equipment to the main base.

The shop is full of interesting items which, as indicated above, will be treated in detail in later issues of this magazine. Among these, the storage battery charging equipment is noteworthy. There are also interesting methods worked out for handling engines in and about the shop as well as special devices for leveling up planes for compass swinging, the protection of propellers while in the shop, special devices for building cowlings, and many others of which limited space prevents adequate discussion in the present article.

The acquisition of the new Lockheed Orions (three of which have already been delivered) and later the twin-engined Lockheed Electras which have been ordered for high speed service between the Twin Cities and Chicago, will introduce a number of new problems for this shop, but with the present nucleus of trained personnel and adequate shop facilities there is little question but that they will be met efficiently and promptly.

